R E M A R K S

Reconsideration of this application, as amended, is respectfully requested.

THE SPECIFICATION

The specification has been amended to correct an obvious clerical error of which the undersigned has become aware.

No new matter has been added, and it is respectfully requested that the amendment to the specification be approved and entered.

THE CLAIMS

Claims 1-20 have been canceled, and new claims 21-33 have been added to more clearly recite the distinguishing features of the present invention. In particular, new independent claims 21-24 recite the feature of the present invention whereby the burst oscillator receives a pulse signal output from a pulse generator and performs an oscillation operation for a time corresponding to the width of the pulse signal to output a short pulse signal serving as the short pulse wave without causing carrier leakage.

No new matter has been added, and it is respectfully requested that the amendments to the claims be approved and entered.

CLAIM FEE

The application was originally filed with 20 claims of which 1 was independent. The application now contains 14 claims, of which 4 are independent. Accordingly, a claim fee in the amount of $220.00 for the addition of 1 extra independent claim is submitted herewith. In addition, authorization is hereby given to charge any additional fees which may be determined to be required to Account No. 06-1378.

THE PRIOR ART REJECTION

Claims 1-20 were all rejected under 35 USC 103 as being obvious in view of various combinations of USP 6,639,543 ("Puglia"), the Federal Communications Commission publication FCC 04-285 (the "FCC publication") USP 5,146,613 ("Anderson"), USP 4,733,199 ("Khanna") and USP 6,668,008 ("Panasik"). These rejections, however, are respectfully traversed with respect to the new claims 21-33.

The present invention as recited in new independent claim 21 is directed to a UWB short-range radar including a transmitting unit which emits a short pulse wave which satisfies a predetermined spectrum mask from an antenna into space, a receiving unit which receives a reflected wave produced by an object existing in space of the short pulse wave emitted by the transmitting unit, and a signal processing unit which performs

an analyzing process for the object based on an output signal from the receiving unit. As recited in new independent claim 21, the transmitting unit includes a pulse generator which outputs pulse signals each having a predetermined width at a predetermined frequency and a burst oscillator which receives the pulse signal output from the pulse generator and performs an oscillation operation for a time corresponding to the width of the pulse signal to output a short pulse signal serving as the short pulse wave "without causing carrier leakage". New independent claims 22-24, moreover, recite substantially the same features.

With the structure of the present invention as recited in new independent claims 21-24, a UWB short-range radar is provided which prevents the generation of carrier leakage and eliminates interference in the radiowave emission prohibited band, both of which arise in conventional UWB radar.

In conventional UWB radar, it is necessary to match a carrier frequency (main lobe) with an SRD band (ranging from 24.05 to 24.25 GHz) to manage the high level of carrier leakage (see page 4, lines 2-7 of the specification). A radiowave emission prohibited band (23.6 to 24.0 GHz) is present near the SRD band, and since the frequency of the two bands are close to each other, when the SRD band is applied to the carrier frequency (main lobe), interference occurs in the radiowave emission prohibited band.

Further, in conventional UWB radar, carrier leakage in the pulse-off time is a significant problem in terms of an average power of the carrier leakage. When a maximum transmission output is defined by an average power, the pulse-off time is several thousand times longer than the pulse-on time and therefore, when there is carrier leakage, the average power is increased, and it becomes necessary to reduce the power to be transmitted in the pulse-on time. Thus, as described on page 2, lines 11-19 of the specification, it is a problem that power of the carrier leakage becomes very high since the pulse-off time is approximately several thousand times longer than the pulse-on time in a UWB short-range radar. For this reason, the performance, such as an exploration distance or the like, of the radar is lowered. See the disclosure in the specification at page 2, line 23 to page 4, line 1, wherein it is described that "when the leakage component S' is large, an output level at the normal transmission timing must be set to be low accordingly, and an exploration distance or the like must be considerably restricted."

By contrast, with the structure of the claimed present invention, carrier leakage does not (theoretically) occur since the transmitting unit is configured to control the oscillation operation of the burst oscillator by the pulse signal Pa (see page 23, lines 9-12 of the specification). That is, the transmitting unit comprises a burst oscillator which receives a

pulse signal output from a pulse generator and "performs an oscillation operation for a time corresponding to the width of the pulse signal to output a short pulse signal serving as the short pulse wave without causing carrier leakage." Thus, with the structure of the claimed present invention, the width, or alternatively cycle and/or frequency, of the pulse are controlled by the transmitting unit so as to reduce radiation at a desired frequency in a spectrum of a UWB radar, thereby preventing the occurrence of carrier leakage.

And without carrier leakage being caused by the transmitting unit in accordance with the claimed present invention, it is possible to set the carrier frequency (main lobe) at an arbitrary point or position on the spectrum mask of the UWB so that almost an entire area of the main lobe can be prevented from overlapping the radiowave emission prohibited band (see page 23, lines 19-23 of the specification). As such, the claimed present invention enables operation of UWB radars without using an SRD band so that interference is unlikely to occur in the radiowave emission prohibited band, and further without causing carrier leakage.

It is respectfully submitted that the cited prior art references do not at all disclose, teach or suggest the above described structural features and advantageous effects of the present invention as recited in new independent claims 21-24. Indeed, the cited prior art does not recognize the same problems

relating to carrier leakage of a UWB radar which are addressed by the present claimed invention and do not disclose a structure which addresses and effectively eliminates these problems.

Puglia describes a pulse-modulator 104 that receives a transmit trigger 103 to generate an "on" pulse, thereby driving a pulse oscillator 106 at a predetermined pulse width. The burst oscillator in Puglia is driven at a predetermined pulse width so as to prevent the burst oscillator from causing carrier leakage.

Anderson describes producing pulse width modulated voltage pulses corresponding to data when a data source 28 is connected to an inverting amplifier 22 by a switch 30, thereby turning an oscillator 20 on and generating bursts of RF oscillation.

Khanna describes using the characteristic of a dielectric resonator so that spurious components are not generated, and spurious oscillation output is not directly generated. In addition, Khanna describes that signals from dielectric resonator oscillators leak through the switch to create unwanted spurious signals in the output signal (see column 1, line 67 to column 2, line 2). And Khanna also describes that when a dielectric resonator is selectively coupled to the amplifier through the switch, a signal is generated (column 2, lines 58-60) and an amplifier is always turned on to cause signals to be generate upon selection of one of the dielectric resonators (column 2, line 67 to column 3, line 2).

Panasik describes using filters to suppress interference when there is potential interference with a frequency band used by other users (see column 1, lines 46-55).

Ishii describes improving an S/N ratio without noise influence even if the noise occurs from a circuit itself which detects a reflection signal from a target (see column 2, lines 38-42). In addition, Ishii describes a gate circuit 21 in a receiving section, and using output of a pulse generating circuit 14 as a control signal, by which a portion other than a corresponding reception pulse can be cut and a target can be accurately detected by the gate operation even if a noise influence is high (see column 7, lines 40-50). Leakage from the gate circuit 21 is output and causes noise which occurs when an input to the gate circuit 21 does not match a gate pulse, and a reflected signal is superimposed on the noise(see column 7, line 58 to column 8, line 2). Thus, in Ishii, the gate operation is performed in the receiving section, and a portion other than a reception pulse can be cut.

None of the cited prior art references, however, discloses or suggests a transmitting unit having a burst oscillator which receives a pulse signal output from a pulse generator and performs an oscillation operation for a time corresponding to the width of the pulse signal to output a short pulse signal serving as the short pulse wave without causing carrier leakage, as according to the present invention as recited in new independent claims 21-24.

Still further, with respect to new independent claims 23 and 24, it is respectfully pointed out that the cited prior art references do not disclose or suggest a burst oscillator which comprises an oscillation unit comprising an amplifier, a resonator, a feedback circuit and a switch circuit cooperating the manner set forth in new independent claims 23 and 24.

In view of the foregoing, it is respectfully submitted that new independent claims 21-24, and new claims 25-33 respectively depending therefrom, all clearly patentably distinguish over the cited prior art references, taken singly or in any combination, under 35 USC 103.

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Entry of this Amendment, allowance of the claims and the passing of this application to issue are respectfully solicited.

If the Examiner has any comments, questions, objections or recommendations, the Examiner is invited to telephone the undersigned for prompt action.

Respectfully submitted,

/Douglas Holtz/

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